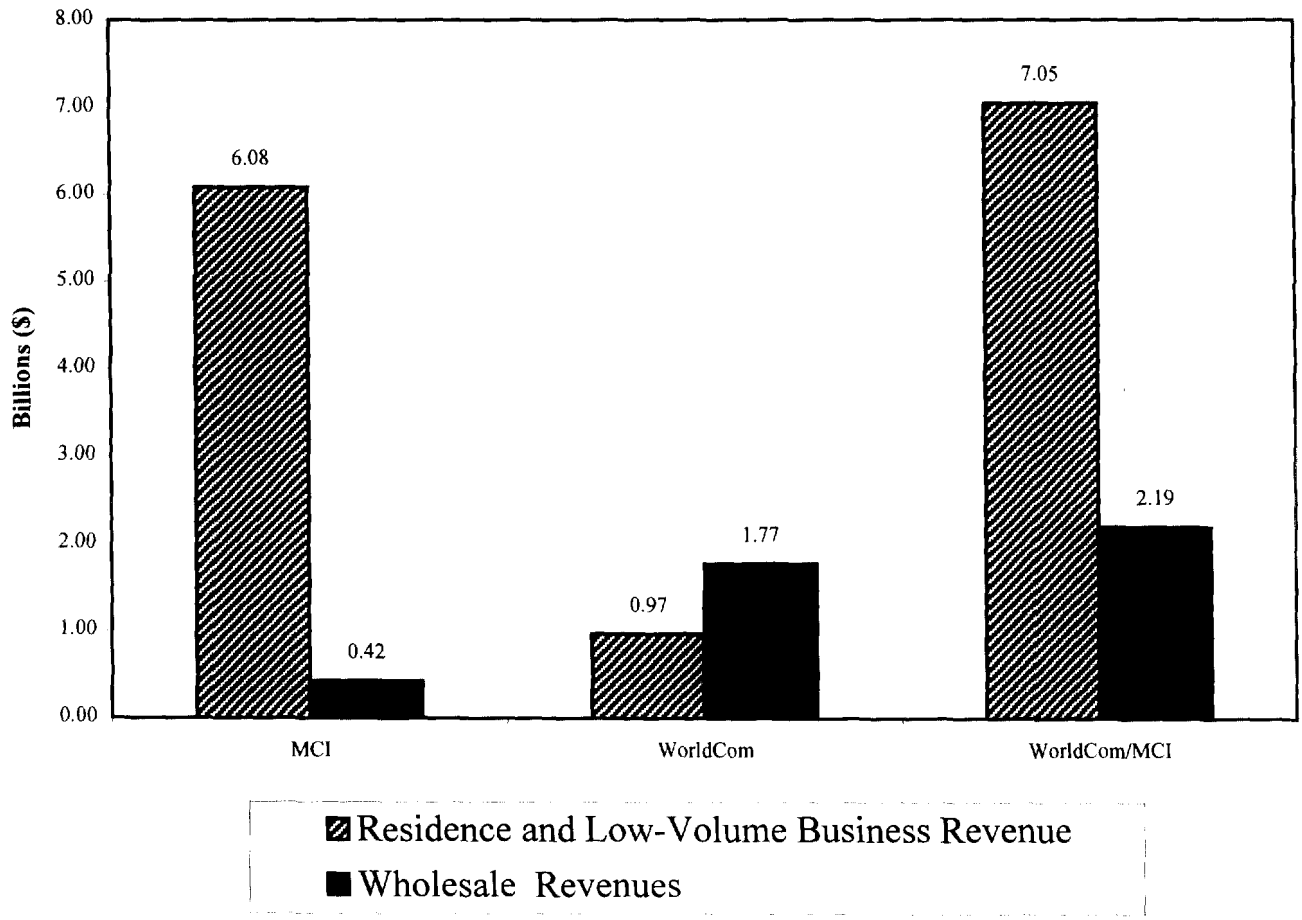
Exhibit 13

WorldCom and MCI Have Different Revenue Distributions
1997

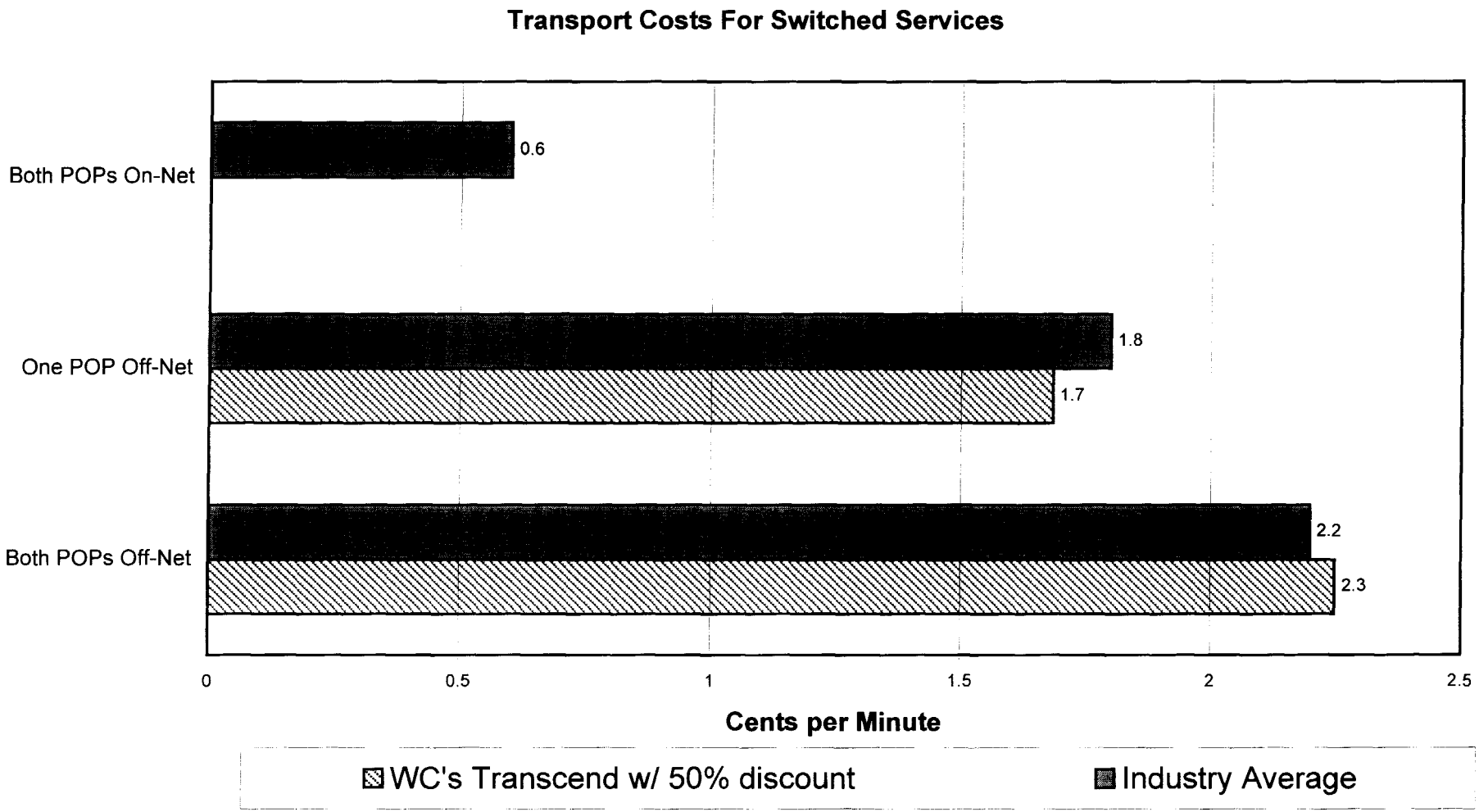


Source:
Frost & Sullivan
Low-volume customers have monthly long distance charges of less than $4,170.

Exhibit 14

The Merger Would Reduce WorldCom's Incentive To Supply Wholesale Service		
	WorldCom (2% Share)	WorldCom/MCI (14% Share)
Profit From Retail (Residence & Low Volume Business)	$ 0.05	$ 0.05
Profit From Wholesale	$ 0.005	$ 0.005
Share of Residence and Low-Volume Business	2%	14%
Expected Opportunity Cost from Selling One Minute at Wholesale	$ 0.001	$ 0.007
Wholesale Profit Net of Opportunity Cost	$ 0.004	$ (0.002)

Exhibit 15



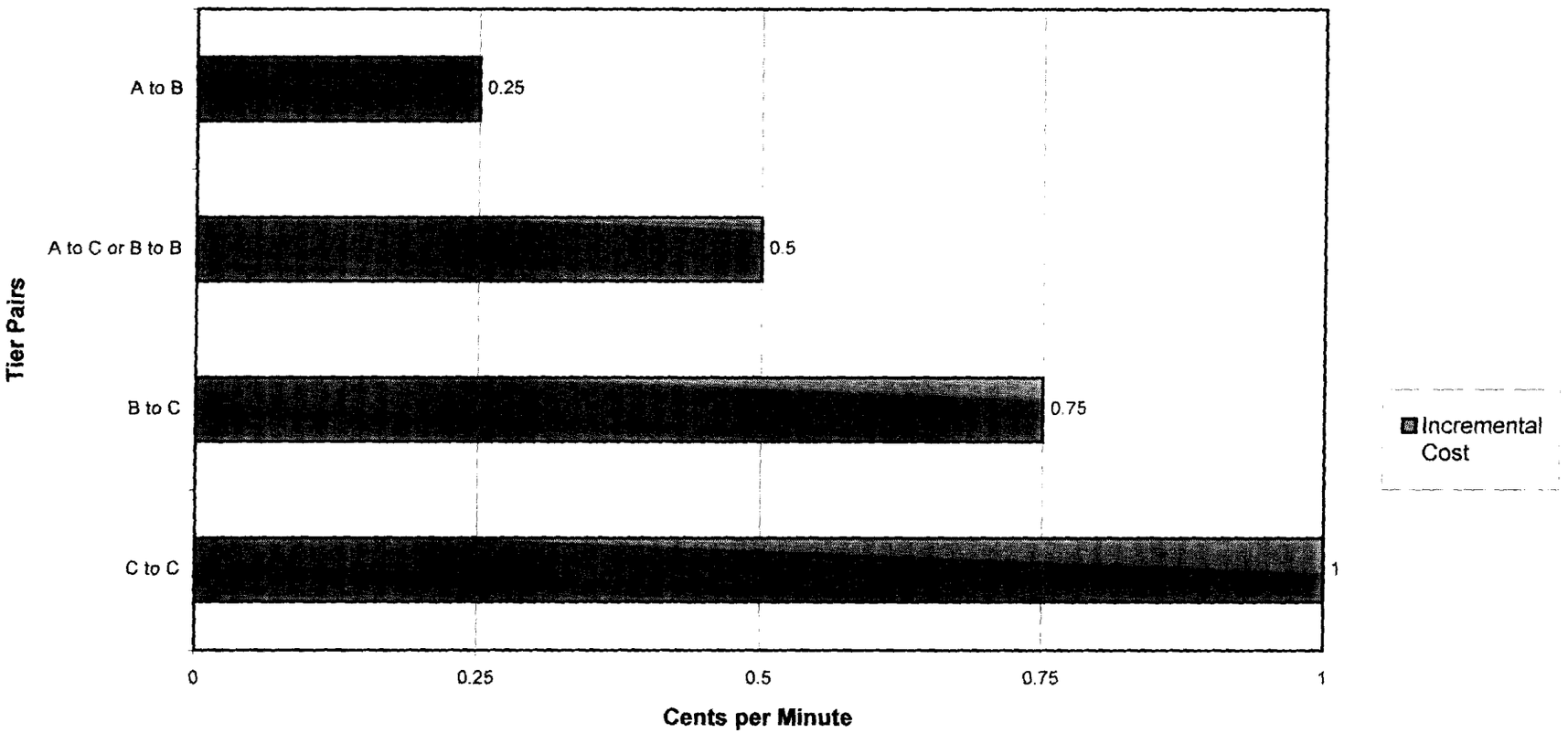
Sources:

Industry Average from Khali Henderson and Casey Freymuth, "Resellers Make a Stand: No More Discriminatory Wholesale Pricing," *Phone+,* July 1997, p. 26

WorldCom Transcend rates from "Resale: A $10 Billion Footnote to the Long-Distance Industry," The Yankee Group, Vol. 11, No. 4, March 1996.

Exhibit 16

Incremental Price of WorldCom's End-to-End Transcend Services When WorldCom is Using Leased Facilities



Source:
"Resale: A $10 Billion Footnote to the Long-Distance Industry," The Yankee Group, Vol. 11, No. 4, March 1996.

APPENDIX 5

Internet Affidavit of Robert G. Harris

Internet Affidavit of Robert G. Harris
On Behalf of GTE
CC Docket No. 97-211

March 13, 1998

Internet Affidavit of Robert G. Harris
On Behalf of GTE
CC Docket No. 97-211

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I. INTRODUCTION AND OVERVIEW

1. My name is Robert G. Harris. My background and qualifications are included in another affidavit being filed concurrently with this one entitled "First Affidavit of Robert G. Harris on behalf of GTE Corporation".

2. The purpose of this affidavit is to provide guidance in analyzing the Internet-related implications of the MCI/WorldCom merger and to respond to the Internet-related issues addressed by Dennis W. Carlton and Hal S. Sider in their affidavit submitted on behalf of MCI and WorldCom before the FCC. Also contained in this affidavit are responses to Internet-related comments contained in the *Joint Reply of WorldCom, Inc. and MCI Communications Corporation To Petitions To Deny And Comments In The Matter Of Transfer Of Control Of MCI Communications Corporation To WorldCom, Inc.*, Jan. 26, 1998, p.69.

3. I conclude that the proposed MCI/WorldCom merger could have potentially significant adverse impacts on Internet-related markets, especially the provision of "backbone" service because it would destroy the existing competitive balance in that market. Because of the its network characteristics, Internet service providers are dependent on efficient interconnection with each other. The proposed MCI/WorldCom merger would result in asymmetries, with all other providers much more dependent on the interconnection with MCI/WorldCom than MCI/WorldCom would be on interconnection with any other provider. As a result of its post-merger size, competing backbones would be disproportionately dependent upon it. This fact fundamentally changes the incentives that exist in today's world where there are many interdependent service providers. As the result of its dominant position in the post-merger market, MCI/WorldCom will be able to control the terms and conditions on which a significant amount of traffic crosses the Internet, creating the potential to pursue a variety of anticompetitive strategies.

4. Since the relative dependence between MCI/WorldCom and other individual backbones will be so lopsided, an easy way for MCI/WorldCom to harm its competitors would be to degrade interconnections, especially if they targeted competitors one at a time. By degrading the interconnection between MCI/WorldCom and a much smaller competitor, the performance of MCI/WorldCom's system would be barely affected, while the effect on the smaller competitor's system would be devastating. Note that because of the Internet's continuing explosive growth in traffic, degradation of service could easily be achieved by slowing down the rate of facilities

upgrades and capacity expansion at private and public interconnection points. This approach is difficult to police as it would appear to the outside world that MCI/WorldCom is providing upgrades, but they would be insufficient to keep up with traffic growth.

5. It is also important to consider that this merger is occurring at a critical phase in the development of the Internet market when important institutional mechanisms are being developed as part of the movement to a more economically rational pricing regime for various services.[1] A merger today which creates a dominant backbone increases the likelihood of anticompetitive behavior going unpunished because it is much more difficult to detect anticompetitive behavior in a dynamic environment without clear cut institutional rules than in a stable environment where rules and norms exist for governing relationships between competitors. Anticompetitive conduct following a backbone merger of this size in a more mature stage of Internet development would be much more readily apparent to all parties concerned.

6. MCI/WorldCom merger aside, there are two issues that are critically important for understanding the changing economic relationships between Internet market participants. The first deals with the role of "network externalities" and the impacts they have on the incentives for interconnection. The second development deals with the impact of increasing congestion on the Internet.

A. Network Externalities and Interdependence

7. A network externality is the cost or benefit that the user of a network derives from an additional entity using the same network. To date, this network externality effect has dominated the economics of the Internet's growth and interconnection policies.

8. One approach to reaping the benefits from network externalities is to structure Internet markets with numerous competing interconnected networks who are interdependent and have the same incentive for high-quality, competitively priced interconnections. Each is competing based on price and service quality, investments in infrastructure, technological progress, and innovative new service offerings.

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[1] For reference purposes, I have included a short historical background of the Internet as Appendix A.

9. Alternatively, network externalities could also result from having one single network provide service to all users. This approach will lead to a monopoly with increased prices, reduced output, lower product quality, and reduced service and innovation. Regulatory intervention would ultimately be necessary, locking in all the disadvantages associated with a monopoly industry structure. Furthermore, it would be very difficult to establish a regulatory regime given the rapid economic and technical changes occurring in the Internet industry.

10. The Internet backbone market post-merger will be closer to the second structure than the first -- it would consist of a single dominant player, MCI/WorldCom, with little incentive to efficiently interconnect with much smaller backbones, and many smaller "parasitic" backbones whose value was primarily driven by their ability to efficiently interconnect with the dominant backbone, MCI/WorldCom.

B. Increasing Traffic Flows and Congestion on the Internet

11. Many portions of the Internet have become increasingly congested. This fact is evidenced by changes in an Internet performance index which show that overall Internet performance degraded 4.5 percent between the first study period in April/May of 1997 and the second in August/September of 1997.[2] Existing congestion on the Internet is being exacerbated by new technologies such as IP telephony, video conferencing, advanced graphical and sound interfaces and others which are dramatically increasing the potential bandwidth consumed by end users. The recent announcement by computer-industry giants Microsoft, Intel and Compaq, along with Bell Atlantic, Bell South, GTE, US WEST and Sprint that they are developing and promoting advanced digital subscriber line (ADSL) standards to facilitate mass market deployment of high speed telecommunications access lines (up to 6 mbs per second) underscores the large new bandwidth demands likely to impact the Internet in the next few years.[3]

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[2] Keynote/Boardwatch Internet Index; http:/www.keynote.com/measures/backbones/backbones.html. Interestingly, the index also shows that World Wide Web content on the Internet travels at an average speed of 5,000 characters per second, or only 40 kilobits per second (kbps). This means that modems capable of operating at 56 kbps or faster (such as cable and satellite modems) are still limited to delivering web content only as fast as the Internet's 40-kbps "speed limit" allows.

[3] Carol Wilson, "The History of ADSL, Part One," *Interactive Week*, February 2, 1998.

12. The impact of increasing usage and congestion on different Internet uses varies. For example, a congested network that delays an e-mail delivery for a modest amount of time would have little or no impact. On the other hand, real-time Internet video conferencing could be completely disrupted. Without economic signals to economize on backbone usage during peak or high usage periods and cooperation among Internet backbones, the amount of network congestion will undoubtedly increase. Hence, in order to preserve and improve efficiency, I believe that a more economically rational pricing system is likely to develop in the near future as technical barriers to such systems are solved. Development of these new institutional mechanisms will take place through unilateral and multilateral negotiations among the players, and it will be difficult to detect anticompetitive behavior by a dominant player during the transitional period when the new rules are being set. If the anticompetitive behavior goes unchecked, it could have a long-term effect on industry structure.

II. ANALYTICAL APPROACH TO ASSESSING MARKET POWER PROBLEMS IN THE INTERNET MARKET

13. Market power is the ability of a single seller or group of sellers acting in parallel to restrict output and raise prices above competitive levels for a significant period of time, and to do so profitably.[4] To determine if a price-increasing strategy is profitable, the supplier must weigh the loss in profit that results from reduced sales against the increase in profit that results from receiving a higher price for the remaining sales it does make. This type of market power is evident where there is a concentration of ownership or control of resources on a horizontal level of production. Vertical market power issues arise when a firm uses its horizontal market position in one segment of its integrated business to adversely affect competition in a vertically-related segment of the business.

14. Market power questions raised by mergers are normally addressed by analyzing the structure of and competitive conditions in one or more "relevant" markets before and after a proposed merger. The key questions to be answered are whether anticompetitive effects are created by the merger, and whether entry would be sufficient either to deter or to counteract the anticompetitive effects.

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[4] Sellers with market power may also reduce product quality, service quality, or innovation.

15. There are two dimensions to defining a "relevant" market – the product line and the geographic area. The product market is defined to include all products that are viewed by buyers as sufficiently good substitutes for one another such that competition between them will place a significant constraint on the prices that can be charged for any one. Similarly, the geographic market should be defined to include all supply locations that are viewed by buyers within the market as sufficiently good substitutes for one another such that competition between them will place a significant constraint on the price that can be charged for the product under consideration. It is important to note that defining the "relevant" market is based solely on consumer, not supplier, responses to price increases. The Department of Justice and Federal Trade Commission Horizontal Merger Guidelines define a "significant" price increase to be five percent or more.[5]

A. Internet Product and Geographic Markets

16. In order to separately identify the markets, I use the Department of Justice and Federal Trade Commission Horizontal Merger Guidelines as a starting point. Specifically, the Guidelines state,

> "the Agency will begin with each product (narrowly defined) produced or sold by each merging firm and ask what would happen if a hypothetical monopolist of that product imposed at least a "small but significant and nontransitory" increase in price, but the terms of sale of all other products remained constant. If, in response to the price increase, the reduction in sales of the product would be large enough that a hypothetical monopolist would not find it profitable to impose such an increase in price, then the Agency will add to the product group the product that is the next-best substitute for the merging firm's product."[6]

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[5] *Department Of Justice and Federal Trade Commission Horizontal Merger Guidelines*, April 2, 1992, p.13-14.

[6] *Department Of Justice and Federal Trade Commission Horizontal Merger Guidelines*, April 2, 1992, p.11.

i. Regional and national data routing and transport (Backbone Service)

17. A relevant Internet-related product market which is served by MCI/WorldCom is the transporting and routing of packets between and among ISPs (defined below as providers of Internet connectivity to end-use customers) and other regional and national backbone networks. This service is referred to as Internet backbone service throughout the rest of the paper. Backbone service customers are other backbone service providers and ISPs.[7]

18. Backbone service providers have historically connected with each other according to "peering" arrangements. These arrangements may be viewed as payments-in-kind. ISPs typically pay fixed fees to interconnect with backbone service providers at connection points according to the capacity of the interconnection, called bandwidth.

19. The backbone service market can be narrowly defined as a product market because there do not appear to be good demand substitutes for ISPs and other backbone service providers to obtain national Internet access (i.e. access to end users or content served by a different ISP) if a hypothetical backbone service monopolist were to raise its connection price above competitive levels.[8] In their reply to comments of intervenors at the FCC concerning the merger, MCI/WorldCom "vigorously disagree with the suggestion that there is a separate 'backbone' market"[9] because transmission facilities used for Internet services and other circuit-switched and packet switched services are fungible. MCI/WorldCom are confusing the issue of barriers to entry with the issue of product definition. Just because there might be low barriers to entry into a particular product market, which I later explain I do not believe is the case here, does not lessen

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[7] Note that some backbone providers are vertically integrated into the ISP business, and self supply backbone service to their ISP affiliates.

[8] The DOJ/FTC merger guidelines point out that where there is a wide gap in the chain of demand substitutes at the edge of the product and geographic market, more market power is at stake than in a market in which a hypothetical monopolist would only raise prices by exactly five percent. Since it does not appear that there are any adequate substitutes (other than terminating service) that would enable backbone customers to counteract price increases foisted upon them by a backbone service monopolist, the DOJ/FTC analysis seems to apply here.

[9] Attorneys of WorldCom, Inc. and MCI Communications Corporation, *Joint Reply of WorldCom, Inc. and MCI Communications Corporation To Petitions To Deny And Comments In The Matter Of Transfer Of Control Of MCI Communications Corporation To WorldCom, Inc.*, Jan. 26, 1998, p.69.

the fact that it is a separable product market. As stated earlier, a product market is defined to include all products that are viewed by buyers as sufficiently good substitutes for one another such that competition between them will place a significant constraint on the prices that can be charged for any one. I do not believe that buyers view transmission facilities as substitutable for transporting and routing of packets between and among and other regional and national networks. The first item is an input into the process of providing the second item. In order to provide transmission and routing of packets between and among networks, the transmission facilities must also be appropriately interconnected with a sufficient number of other backbones, ISPs, and routers.

20. The geographic market for backbone service is limited to the area in which it is cost-effective for ISPs to lease or buy transport facilities connecting them to a regional or national backbone. For example, assume that there is only one backbone operator with an interconnection point of presence (POP) in San Francisco and that it has previously charged ISPs a competitive market rate of $1,000 for interconnection in San Francisco, but decides to raise its rates by five percent to $1,050. If the customers of the backbone service provider had the ability to buy or lease additional transport to interconnect with a different backbone provider in another city like San Jose for less than a combined $1,050, the San Jose backbone service provider would be considered as part of the same geographic market according to the Department of Justice Horizontal Merger Guidelines. However, if the combined transport and interconnection cost was more than $1,050, San Jose would be considered to be in a different geographic market.

21. Given that GTE charges a maximum $50,000 for a DS-3 interconnection,[10] if it costs more than $2,500 to reach another backbone interconnection point, that point would be in a different geographic market. In many instances, DS-3 transport is not available between cities at this price.

22. Because there are a number of national backbone service providers that offer interconnection in major metropolitan areas, the analysis conducted in this paper assumes that the backbone services market is national. This assumption is conservative because there are probably some geographic areas where the separate MCI/WorldCom backbones provide a much higher

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10 "National Backbone Operators - GTE/BBN", *Boardwatch Internet Service Providers Directory for Fall 1997*, Copyright BoardWatch Magazine, 1997, p.137-141.

share of backbone service than would be indicated by their average nationwide share. In these areas, the merged company has a much higher likelihood of exercising market power profitably.

ii. Internet Connectivity (Internet Service Provision, or ISP)

23. Another relevant product market served by MCI/WorldCom's network is Internet connectivity to end-use customers through dial up or dedicated connections known as ISP service. Dial-up consumers place a local phone call to connect to their ISP's modem bank, which then transports their data along high speed lines to a public or private interconnection point of a regional or national backbone service provider that will transport and route the data as appropriate. Customers purchasing direct connectivity from an ISP typically lease high speed fiber that leads directly to the POP of a regional or national network. Some ISPs target the mass market, America Online (AOL) and Microsoft Network (MSN), for example, have an extremely user-friendly interface and bundle proprietary online services with connectivity. Other ISP's target businesses by offering high-speed direct connectivity and specialized services.

24. Some ISP's (typically the smaller ones) focus solely on providing service up to the point where they interconnect with regional and national backbone service providers, while others are vertically integrated into the provision of backbone services. In some cases end-use customers can buy direct connectivity to an integrated provider's backbone. Direct physical connectivity to the backbone does not change the fact that the connectivity service is in the ISP, not the backbone market. While vertical integration and the sharing of physical facilities among affiliated backbones and ISPs may blur the lines between ISPs and backbones in press accounts and among the Internet-using public, it does not change the fact that providing end users connectivity is a different product than transporting and routing traffic among ISPs.

25. The geographic market for Internet connectivity is limited to a relatively small area because service is provided to dial-up consumers within a local telephone calling area, or to direct connectivity customers that can cost-effectively lease or buy a high speed line to an ISP POP.

iii. Internet Exchange Service

26. Internet exchange services are provided at private interconnection points and public network access points (NAPs), and allow backbones and ISPs to interchange and route traffic from one carrier to another. Because of the significant amount of congestion that occurs at the public NAPs, the larger backbone service providers already exchange the majority of their traffic at private interconnection points.[11] However, since the public NAPs are a place where smaller ISPs or backbones can interconnect with more than one player cost-efficiently, reasonable access to these facilities is particularly important to facilitate entry into the market by players that do not have enough traffic to justify purchasing dedicated transport out to a large number of different private interconnection points.

27. There are only fifteen NAPs where backbones and ISPs can negotiate bilateral and multilateral interconnection agreements.[12] Of these, only 12 have more than one backbone present. Five of these are now owned by WorldCom.

iv. Internet Content Services

28. Internet Content Services include both the original content providers (such as ESPNNet, Sportszone, or the Yahoo web site) and the web server hosting facilities that provide servers and connectivity for the content. The geographic market for Internet content services is world wide because content, such as a web site, can exist anywhere as long it is connected to a fully interconnected Internet.

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[11] See: Warren Wilson, "Hitching A Speedier Internet Ride", *Seattle Post*, Dec. 10, 1997, http://www.internap.com/seapi.htm. Joel Snyder, "Traffic Sense", *Internet World*, Jan. 1997, http://www.internetworld.com/print/monthly/1997/01/bottom.html. Tom Valovic, "Internet Meltdown: Could It Happen?" Telecommunications® - Americas Commentary, April 1996, http://www.telecoms-mag.com/marketing/articles/apr96/tcscomm.html. Todd Spangler, "ISP Plans Private NAPs", *WebWeek*, Nov. 17, 1997, http://www.webweek.com/1997/11/17/ispworld/19971117-private.html.

[12] Jack Rickard, "The Internet - What Is It?" *Boardwatch Internet Service Providers Directory for Fall 1997*, Copyright BoardWatch Magazine, 1997, p. 11.

B. Barriers To Entry

29. Another critical piece in examining the potential to exercise market power is to analyze the potential for entry into the market, and specifically identify whether such entry is enough to deter or counteract any potentially anticompetitive effects of a merger. In markets where entry is timely, likely, and sufficient, the merger is less likely to raise antitrust concern.

30. As explained in more detail below, I believe the network externalities associated with the backbone services market and other factors create sufficient barriers to warrant a concern that entry will not be sufficient to counteract anticompetitive effects arising from the merger.

III. WORLDCOM'S PRE-MERGER INTERNET-RELATED ACQUISITIONS AND STRATEGIC ALLIANCES

31. Prior to WorldCom's proposed merger with MCI, WorldCom had an enormous number of Internet-related acquisitions, mergers, and strategic alliances, integrating horizontally and vertically into various Internet service markets in the United States and abroad. Appendix B to this affidavit provides a list of WorldCom's recent acquisitions.

32. Specifically, WorldCom vertically integrated into the ISP and content markets directly through its purchase of UUNet (which was already in the ISP market) and via long-term contracts with other ISPs. The company also vertically integrated into ownership of the underlying telecommunications network facilities used to provide Internet services through its purchase of WillTel in 1995.

33. One aspect of WorldCom's position in Internet services markets is its quasi-vertical integration with America Online via a long-term, five-year contract to provide backbone and other network services.[13] This agreement between AOL and WorldCom was part of a complex agreement signed in September 1997 between WorldCom, AOL and CompuServe. The net result of the agreement was that WorldCom acquired the Internet backbone networks of ANS and CNS from AOL and CompuServe, while AOL acquired the CompuServe Internet subscribers.[14]

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[13] *WorldCom, Inc. – Corporate Milestones*, http://www.wcom.com/timeline.html.

[14] *WorldCom, Inc. – Corporate Milestones*, http://www.wcom.com/timeline.html.

WorldCom also has a five-year agreement with the Microsoft Network (MSN) to provide backbone and other network services.[15]

34. The key issue that emerges is WorldCom's increasing concentration in the Internet backbone services market. WorldCom has 100% ownership of 3 major national backbones, UUNet, CompuServe's former backbone CNS, and AOL's former backbone ANS. Additionally, WorldCom launched and owns a majority stake in GridNet and acquired an interest in Verio when they purchased Brooks Fiber.

35. Figure 1 below, shows WorldCom's primary Internet business acquisitions in Internet exchange, backbone, ISP, and content markets organized by market type. This figure provides a graphical representation of the extensive vertical and horizontal integration in Internet markets even prior to the merger with MCI.

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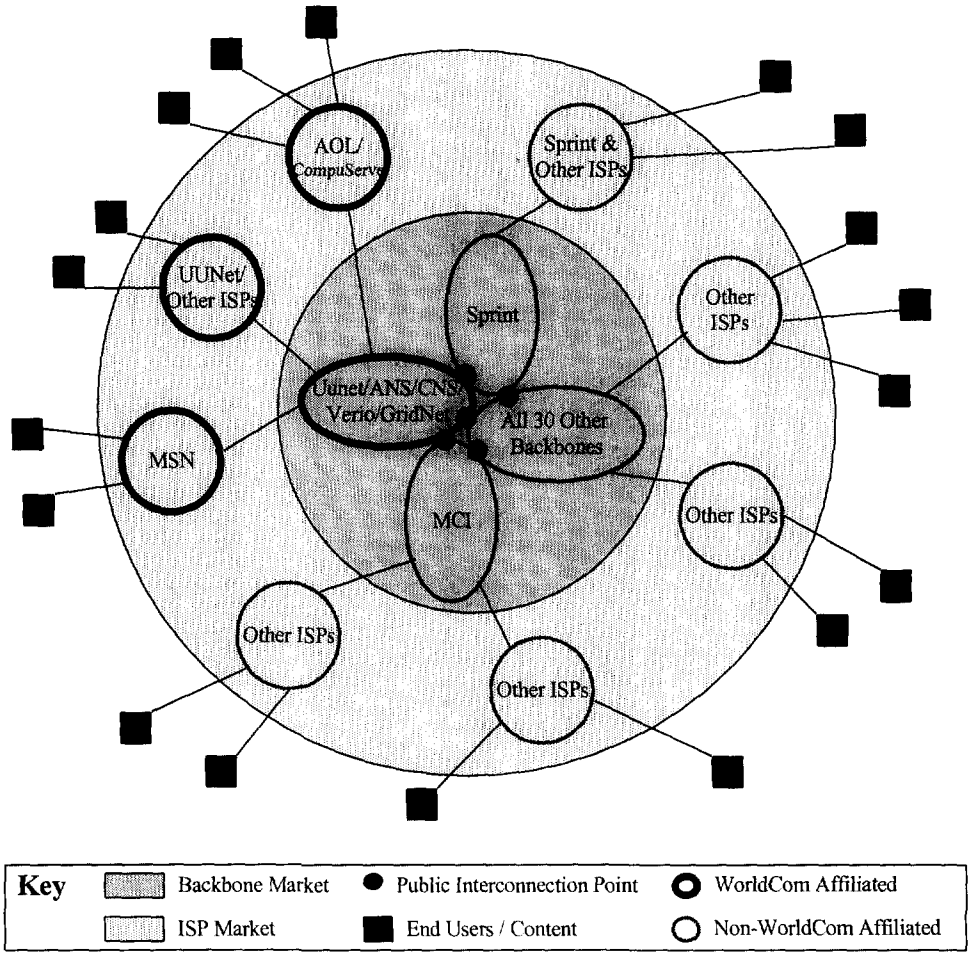
15 Arthur Newman, *The Future of The Internet Access Industry*, Gerard Klauer Mattison & Co. LLC, May 1996, p.88.

Figure 1
WorldCom's Primary Internet Services Organized by Vertical Production Stage



IV. IMPACTS OF THE MERGER ON BACKBONE SERVICE MARKET STRUCTURE

36. This section attempts to assess the likely changes in the backbone service market resulting from the MCI/WorldCom merger. Although I have defined other relevant product markets associated with the Internet, I believe the backbone services market merits the most concern by regulators because of the dramatic increase in market concentration and the resulting shift in power among backbones caused by the merger.

A. Internet Backbone Services

37. The dependence existing between and among backbone service providers is a key driver that determines the dynamics and competitiveness of the Internet backbone services market. If the dependence between and among backbone service providers becomes severely unbalanced, the largest ones will have the ability to dominate other backbones by threatening disconnection, degrading interconnection services, or charging monopoly prices for interconnection.

38. Today the market is characterized by mutual interdependence where no one backbone can dominate the others and all must cooperate in order to efficiently serve their customers. The term "coopetition" was coined to refer to the situation where cooperation among competitors is required for the smooth functioning of a market.[16] In the future, these relationships will continue to be important because service providers are providing guarantees about speed and quality that can only be realized if the cooperation that characterizes the current market continues and improves.

39. However, if the MCI/WorldCom merger is consummated, the backbone market will be dramatically restructured such that one backbone network, MCI/WorldCom, will be much less dependent on its connections to other individual backbones. This diminished dependence on other service providers will give MCI/WorldCom insurmountable leverage to dictate the terms, conditions, and pricing of interconnection. Coopetition will be replaced by domination.

40. At the other extreme, smaller backbones will be totally dependent on being able to interconnect with the dominant backbone in order to create value in their network. This parasitic relationship with the dominant provider leaves the smaller providers without any leverage and subject to the terms and conditions imposed by the dominant backbone.

41. The goal of measuring the market shares of Internet backbone service providers should be to provide an indication of the relative dependence between the various players. However, measuring market shares of Internet backbone service providers is a difficult issue because the industry is so new, is growing so fast, and is so dependent on proprietary data and technologies that finding verifiable public data is almost impossible. Most of the information about the market comes from trade journals such as *Boardwatch*, from other news providers, or from

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16 For more information regarding coopetition and its application in other markets, see: Adam M. Brandenburger and Barry J. Nalebuff, *Co-opetition*, Currency Doubleday, May 1996.

anecdotal evidence. The analysis presented in this affidavit is limited to publicly available data sources and should be viewed as a preliminary attempt to understand the relative size of competing players in the backbone market.

42. In its filing before the FCC, Bell Atlantic provides a table that summarizes various pieces of anecdotal press estimates of market concentration in the Internet backbone market following the MCI-WorldCom merger. It is interesting to note that none of the estimates result in a market share of less than 49% for the merged company.[17] Below, I describe and assess a number of potential methods for measuring backbone market share.

i. Markets shares based on revenues

43. A typical approach for measuring market share in any horizontal merger is to derive shares by calculating the total revenues of all providers in the market, and then to calculate each firm's share of that revenue. The results of this calculation often provide a good indication of the relative size of each firm in the market being studied. This approach is not the best way to measure backbone market share, however. For example, backbone service providers that are also vertically integrated into the ISP market would be "self-supplying" backbone service, and thus no revenue would change hands. Market shares calculated based on revenues, then, would be understated for those backbones which also provided ISP services. Also, backbone service revenues might understate the amount of backbone service being provided by operators who have long-term contracts with large ISPs at prices reflecting term and volume discounts. Market shares based on revenues would be understated for these operators. This is especially true for WorldCom, which has long-term contracts with the two largest ISPs, AOL and MSN.

44. A more practical problem with using revenues stems from the fact that the information to perform this task does not exist in the public domain because revenues are not reported separately for backbone services as distinct from other Internet-related services performed by the same company.

45. However, despite these difficulties, in their reply to the FCC, MCI/WorldCom attempt to use revenue-based market shares to show that they will have only 20% of the revenue for all

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[17] Attorneys for Bell Atlantic, "Estimates of Market Concentration in the Internet Backbone Following a WorldCom/MCI Merger", *Petition To Deny the Application of WorldCom or, in the Alternative, To Impose Conditions*, Jan. 5, 1998, p.5.

Internet-related services.[18] This percentage is derived by doubling the US total 1996 Internet industry revenue figure of $2.3 billion taken from a Frost & Sullivan study,[19] and applying the 1997 estimated Internet revenues of MCI and WorldCom to that base figure. As I have shown above, there are multiple product markets associated with Internet related services and WorldCom/MCI are mistakenly including all Internet-related revenues under a single market. In fact, Figure 3-2 of the Frost & Sullivan study shows that 48.3% of their forecasted 1997 total Internet revenue is associated with "on-line" services, such as AOL, Compuserve, and MSN.[20]

46. A more appropriate calculation, subject to the criticisms I mentioned earlier about using revenues to calculate market share, would be to look solely at the revenues associated with each product market. Although the revenue data is not available, if revenues for ISP services (including on-line services) were deducted from the numerator and denominator of MCI/WorldCom's analysis I would be surprised if MCI/WorldCom's resulting backbone market share was not in the 40-50 percent range which I estimate later in this paper suing another method.

ii. Market shares based on traffic

47. Another method of deriving market shares would be based on the amount of traffic carried by each backbone network as a percentage of total Internet traffic. This would include traffic that originated and terminated on a single backbone and traffic which crossed multiple backbones. This market share measure would provide a reasonable proxy for the relative dependencies of backbone service providers. This data is not publicly available, however, so I was not able to include it in my analysis.

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18 Attorneys of WorldCom, Inc. and MCI Communications Corporation, *Joint Reply of WorldCom, Inc. and MCI Communications Corporation To Petitions To Deny And Comments In The Matter Of Transfer Of Control Of MCI Communications Corporation To WorldCom, Inc.*, Jan. 26, 1998, p.73.

19 I could not find this number, but Figure 3-1 of the Frost & Sullivan report that I used provides a total US Internet service revenue of $2.5 billion in 1996. For that reason, I assume the estimate provided by MCI/WorldCom is its estimate of its US market share as opposed to worldwide market share. See: "Figure 3-1: Total Internet Service Market: Revenues Forecast (U.S.) 1992-2002", *U.S. Internet Service Markets*, Copyright Frost & Sullivan, 1996, p.3-7.

20 "Figure 3-2: Total Internet Service Market: Percent of Revenues by Service Type (U.S.) 1992-2002", *U.S. Internet Service Markets*, Copyright Frost & Sullivan, 1996, p.3-10.

iii. Market shares based on backbone capacity

48. Another way to measure backbone market share might be to calculate the throughput capacity of each of the backbones weighted by the geographic footprint served by that backbone. This method of calculating market shares does not provide a good indication of a service provider's importance in the marketplace, however, because the value of a network is derived from being able to reach other users, and the mere existence of physical capacity does not translate into having customers signed up and using that capacity.

iv. Market shares based on number of connections

49. Another potential method of calculating market share is based on the number of connections made to each particular backbone by ISPs and other backbones. This measure provides an excellent indication of how important a particular backbone network is in providing routing and transit service between ISP's and other backbones and, therefore, an indication of the relative dependence between backbone service providers. In the extreme, a backbone service provider that is connected to 1,000 ISPs (which are in turn connected to a certain amount of end-use customers) is much more crucial and much less dependent on other backbone service providers than is a provider with only 10 similarly-sized connections.

50. A data set exists that makes it possible to measure backbone market share by measuring the number of small number of ISPs who are directly connected to each of the backbones, as well as measuring the total bandwidth associated with a subset of those connections.[21]

[21] The ISP connections listed in *BoardWatch* are for ISPs that are not vertically related to backbone service providers.

B. Pre-Merger Backbone Market Shares

i. WorldCom's Market Share of Connections to ISPs

51. *BoardWatch* magazine, an ISP trade press publication, maintains a dataset with information on small ISPs' links to backbone operators.[22] Using this information, I calculated the market share of each backbone service provider based strictly on the number of small ISP's that link to each of the backbones. The results are shown in the second column of the table below.

52. Two criticisms of this calculation put forward by MCI/WorldCom are that "there would be significant double-counting because ISPs are often connected to more than one other ISP 'backbone' provider" and the "number of ISP connections does not indicate whether the ISPs are large, small, or medium-sized; for this reason, among others, it does not indicate the ISP's actual position within the Internet industry".[23] In order to respond to these criticisms, I performed a second calculation based on the amount of bandwidth connected to each backbone. *BoardWatch* maintains a separate publicly available online data set listing 1,675 ISPs and the backbones they are connected with, along with the total size of the bandwidth associated with their connections.[24] In instances where ISPs were connected to more than one backbone (616 of them were), we divided the amount of bandwidth evenly between the backbones. Admittedly, ISPs that are connected to more than one backbone might not have the same sized connection with all of their backbone providers. Given that I did not have any information on exactly how bandwidth is split across backbones, I believe that dividing the bandwidth evenly is a reasonable approach to estimating backbone market shares in an unbiased way.

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[22] The Fall 1997 BoardWatch Directory of ISPs (p.320-520) provides summary statistics on the number of small ISPs with connections to the 36 largest backbones. This data includes the more than 4000 small independent ISPs stored in the BoardWatch master database. Larger ISPs are classified by BoardWatch as national dial up access providers who provide service in 25 or more area codes. These larger providers are not included in the BoardWatch data.

[23] Attorneys of WorldCom, Inc. and MCI Communications Corporation, *Joint Reply of WorldCom, Inc. and MCI Communications Corporation To Petitions To Deny And Comments In The Matter Of Transfer Of Control Of MCI Communications Corporation To WorldCom, Inc.*, Jan. 26, 1998, p.72.

[24] Data were obtained through http://www.boardwatch.com on 1/23/1998.

The results are shown in the third column of the table below.

Figure 2
Backbone Market Shares as of Fall 1997
Prior to the MCI/WorldCom Merger

	Connector Based[25]		Bandwidth Based[26]	
Backbone provider	Number of ISPs with Connections	Market Share	Total Bandwidth (Mbps)	Market Share
MCI	1689	29.36%	3730.05	23.88%
Sprint	1298	22.57%	2419.03	15.49%
WorldCom (UUNET/CIS/ ANS/GridNet/Verio)	1149	19.98%	3591.19	23.00%
AGIS	354	6.15%	409.58	2.62%
BBN	234	4.07%	670.72	4.29%
DIGEX	114	1.98%	418.69	2.68%
CRL	106	1.84%	323.04	2.07%
GOODNET	75	1.30%	432.00	2.77%
iStar	71	1.23%	N/A	N/A
DATAXCHANGE	50	0.87%	167.04	1.07%
CWIX	46	0.80%	242.07	1.55%
PSINET	35	0.61%	204.87	1.31%
SAVVIS	33	0.57%	338.73	2.17%
AT&T	24	0.42%	129.78	0.83%
Other	474	8.24%	2540.04	16.26%
Total	5752	100.00%	15616.84	100.00%

53. Although links between large ISP's and other backbones are not included in the dataset, many of the large ISP's are vertically integrated into the backbone service market (UUNET, IDT, Netcom, and others) and therefore "link" with themselves. These self supplied backbone services appear to be substantial for UUNET in particular because it is one of the largest

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[25] Source: "Backbone Market Share", *Boardwatch Internet Service Providers Directory for Fall 1997*, Copyright BoardWatch Magazine, 1997, p.6., and http://www.boardwatch.com

[26] Data were obtained through http://www.boardwatch.com on 1/23/1998.